Academic Resilience, Academic Buoyancy and the Motivation and Engagement Scale: A Construct Validity Approach

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Statement of Sources

I declare that this report is my own original work and that the contributions of others have been duly acknowledged.

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Kate H. Stephens

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Abstract

University students navigate a variety of adversities throughout their studies. Academic resilience and academic buoyancy reflect a student's ability to cope with major maladaptive adversity or low-level impeding adversity respectively. This study investigated whether academic resilience and academic buoyancy can be empirically differentiated using the Academic Resilience Scale (ARS) and Academic Buoyancy Scale (ABS) developed by Martin and Marsh (2006, 2008a). Construct validity was assessed for both scales, as well as the Motivation and Engagement Scale University-College (MES-UC) also developed by Martin (2009). The total sample comprised 761 university students (575 females, 186 males) who completed the ARS and ABS, a sub-sample of which (44; 26 females, 18 males) completed further scales including the MES-UC, Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, & McKeachie, 1991), Academic Resilience Scale 30 (ARS-30) (Cassidy, 2016) and revised Adult Attachment Scale (AAS-r) (Collins, 1996). Correlational analyses established a significant strong positive correlation between the ARS and ABS. The MES-UC was found to be a relatively appropriate measure of motivation and engagement constructs as evidenced by a significant moderate positive correlation with the MSLQ, and a weak positive correlation with the AAS-r. The ARS and ABS showed non-significant weak negative correlations with the AAS-r, but did not correlate with the ARS-30, suggesting they may be measuring constructs unrelated to academic resilience. Theoretically, these results call for Martin and Marsh's predictive model, factors and literature around academic resilience and academic buoyancy to be revised, and for the merit of research and assessments using their respective scales to be re-evaluated. Practically, a single global scale reflecting academic resilience and academic buoyancy as different levels of one construct may be beneficial for strategic interventions and assessments of students in the future.

Introduction

Throughout life individuals will face differing levels of adversity and experience challenges ranging from everyday set-backs (e.g. poor time management, conflict in relationships or financial strain) to significant negative events (e.g. being in a major accident, experiencing a natural disaster or the death of a family member). The ability to adapt to adversity varies considerably between individuals. Some continue on and thrive despite hardships, some will regain balance after time suffering, and others will succumb to the suffering (Davis, Luecken, & Lemery-Chalfant, 2009). The reason responses differ between individuals is complex and highly variable, however it focuses around their ability to display resilience in the face of such adversities. Resilience can occur in a range of contexts and situations, however there is no singular, universally agreed upon definition of "resilience". Luthar, Cicchetti and Becker (2003) propose resilience as the process of effective adaptation in the face of significant threat, adversity, or major setbacks to development. Resilience research has focused predominantly on the general resilience of individuals who have experienced major adversities (e.g. learning disability, chronic anxiety), as it is not relevant to those without these experiences (i.e. resilience cannot be demonstrated without such challenges). However, there remains a lack of research into everyday setbacks and specific resilience contexts. For example, academic adversity and academic resilience have received minimal attention in academic literature despite their importance to all potential, current and past students (Martin & Marsh, 2009).

The population of students attending university in particular has become more diverse in recent years, in part facilitated by institutions providing flexible enrolment, entry and study load options (Martin & Marsh, 2009). In Australian universities there is an increasing number of international and culturally diverse students, more mature-aged students (i.e. those who commence study after age 21), increased students attending from low socioeconomic

backgrounds, and more who are the first in their family attending university (Rickard et al., 2018). This diversification provides students the opportunity to learn from, and alongside, a range of individuals with different backgrounds and life experiences, as well as promote students to be open and tolerant of peer differences. However, diversity is also accompanied by inflated risk factors of adversity, which refer to experiences that have the capacity to disrupt students' normal functioning by producing undesirable outcomes (Noltemeyer & Bush, 2013).

Academic resilience is demonstrated by students who are able to maintain high academic performance and achievement, regardless of the influence of adversities that can result in underachievement or failure (Martin & Marsh, 2009). Schools, universities and other academic domains are areas where adversity, setbacks and challenges are a consistent reality in students' everyday lives (Martin & Marsh, 2009). Consequently, academic resilience is a key factor in both short and long-term student outcomes. Every student will experience a form of stress, difficulty or adversity that they will need to overcome at some point in their time whilst studying at university (Martin & Marsh, 2006). The ability of an individual student to adapt to adversity is determined by the academic resilience they demonstrate under their given circumstances (Noltemeyer & Bush, 2013). Although it is important to focus on student experiences and responses to major academic adversity, it should not be at the expense of understanding how those students who experience only low-level academic adversity adapt. Given the range of adversities that students may face (e.g. financial pressures, health issues, cultural differences or language barriers), not every student will experience the same type of adversity or require the same level of resilience to overcome the associated challenges. The knowledge gained from understanding the differences in adversity between vulnerable groups will contribute to the development of tailored prevention and

intervention approaches to enhance motivation, engagement and foster resilience in all university students.

The motivation and engagement scale

Motivation and engagement are important factors in academic life as they refer to students' ambition and energy directed towards meeting their academic potential. This is observed through engaging with positive learning behaviours (e.g. being attentive or acting conscientiously) and working effectively to achieve academic goals (Martin, 2008). As such, motivation and engagement are important factors that support a students' academic performance, enjoyment and interest within the learning environment. Martin (2001) developed an integrative framework detailing key factors (termed dimensions) that reflect adaptive and maladaptive student motivation and engagement, as detailed in the Motivation and Engagement wheel (2001; Figure 1). The wheel is comprised of four higher-order dimensions, and eleven lower-order factors which are categorized within the higher-order dimensions (Martin, 2007). Adaptive cognitions consist of self-efficacy, mastery orientation and valuing, whilst adaptive behaviours consist of persistence, planning, and task management. In contrast, impeding/maladaptive cognitions consist of anxiety, failure avoidance, and uncertain control, whereas maladaptive behaviours consist of self-handicapping, and disengagement (Martin, 2007).

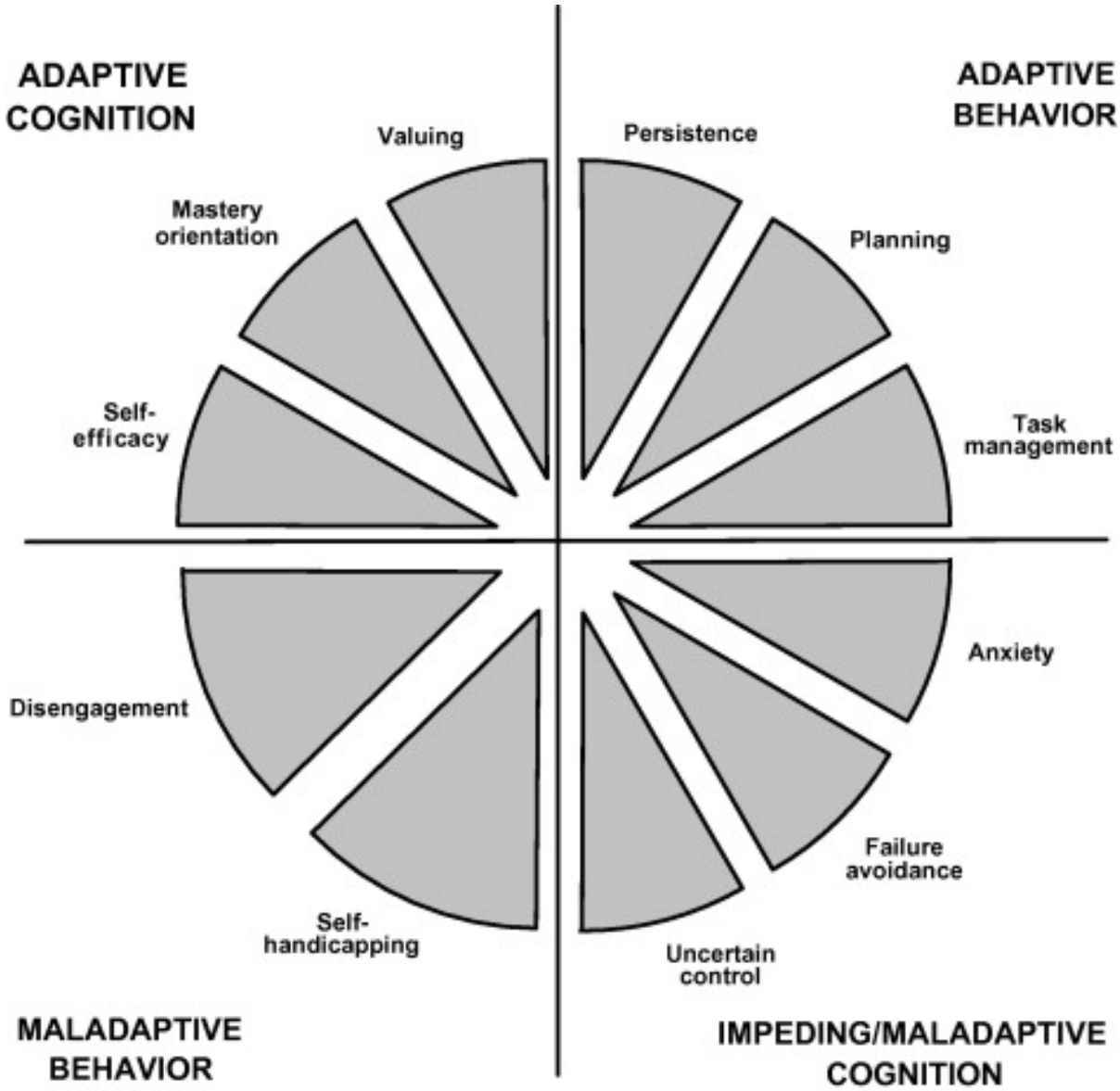

Figure 1. Martin's (2007) Motivation and Engagement Wheel

From this framework Martin (2001) developed the Student Motivation Scale, which has been refined to form the Motivation and Engagement Scale (MES). The MES is a 44 item self-report Likert scale and has been adapted for a diverse range of applied settings (Liem & Martin, 2012). High school students were the initial focus of the MES before it was adapted for primary school, university, work, sport, and music settings (Martin, 2001, 2006). The Motivation and Engagement Scale for University and College (MES-UC) has received less research attention than the original MES, and until the suite of context-specific instruments

were developed the general form of the MES was applied to all research conducted despite being demonstrated as an insufficiently robust measure for university contexts (Martin, 2009). The need for a context-specific university measure is not surprising considering that compared to students in other contexts, those at university are more likely to be older, self-motivated, more mature and have a greater focus on goal and future oriented outcomes (Chisholm-Burns, Spivey, Sherwin, Williams, & Phelps, 2019). This means that university students, having had some degree of control in what they're learning, are more motivated to learn and understand the content because of their intrinsic interest in it and the link to their future outcomes (Tüysüz, Yildiran, & Demirci, 2010).

The MES-UC was validated by Martin (2009) using a sample of 420 Australian university students from two universities. Data was collected from the MES-UC, the Academic Buoyancy Scale (a measure developed by Martin and Marsh, 2008a, assessing student ability to negotiate everyday challenges), as well as measures of positive intentions, enjoyment at university, class participation and homework/assignment completion. Martin (2009) reported that the results of a confirmatory factor analysis supported the model of student motivation and engagement comprising eleven lower-order factors, and four higher-order factors. Based on these results, Martin (2009) concluded the MES-UC was a reliable measure of motivation and engagement in tertiary populations. However, this validation employed only the elementary, high school, and university versions of the MES, using no other independent and validated scales of motivation or engagement. Therefore, the MES-UC needs to be further validated using independent scales in order to be considered reliable. Multiple validation studies have analysed the original form of the MES, now considered the Motivation and Engagement Scale – High School (MES-HS), in which similar issues arise with no use of independently validated scales to ensure the measurement is true to the constructs of motivation and engagement (Martin, 2007; Martin, Malmberg, & Liem, 2010).

Martin's theory of academic resilience and academic buoyancy

The concepts of academic resilience and academic buoyancy were derived from the motivation and engagement framework (Figure 1), and assist in managing different levels of maladaptive dimensions within the framework. As previously detailed, academic resilience and academic buoyancy are the constructs that foster student's positive relationships with their educational life and their ability to adapt in the face of both major and minor academic adversity (Martin & Marsh, 2009). Martin and Marsh (2009) proposed academic resilience, as measured by the Academic Resilience Scale (ARS), has been typically associated with high-level academic adversity (major maladaptive factors) posing a crucial threat to students' educational development, such as students with clinically diagnosed anxiety, or who are the first in their family to attend university. Academic resilience is deemed less applicable to more general everyday academic adversities (low-level impeding factors), such as competing deadlines and poor grades. Martin and Marsh (2009) argue these general academic adversities are relevant to the majority of students and are better reflected by the construct of academic buoyancy, as measured by the Academic Buoyancy Scale (ABS). Additionally, Martin and Marsh (2009) argue academic resilience and academic buoyancy to be distinct constructs due to differences in relative samples, operational factors and interventions, and relationship to varying levels of academic adversity (Martin & Marsh, 2009). They further argue that academic resilience and academic buoyancy differ in both degree and kind. Difference in degree refers to resilience protecting against chronic under-achievement, whilst buoyancy protects against individual instances of poor performance (e.g. poor grades). In turn, differences in kind are indicated whereby resilience protects against incapacitating anxiety and depression, whilst buoyancy protects against low levels of stress and under-confidence (Martin & Marsh, 2008a).

The difference between academic resilience and academic buoyancy

Martin (2008, 2009, 2013) has continually argued that academic resilience and academic buoyancy are separate, distinct factors in terms of their definitions, interventions and operationalisation. The ARS (measuring academic resilience) and ABS (measuring academic buoyancy) are both self-report Likert scales. The ARS consists of 6 items, a 4-item subset of which comprises the entire ABS, suggesting confounding parameters. With an overlap of the measurement indices at this degree, it seems probable that the constructs of academic resilience and academic buoyancy are different with respect to magnitude rather than type. As mentioned previously, Martin and Marsh (2009) argue that academic resilience is reflective of major maladaptive adversity, whereas academic buoyancy is reflective of low-level impeding adversity. However, research into the predictors of academic resilience and academic buoyancy have identified the same "5-C" model for both constructs (Martin, Colmar, Davey, & Marsh, 2010; Martin & Marsh, 2006). The 5-C model details a range of motivational factors including confidence (high self-efficacy) ($\beta = 0.17$, $p < .05$; $\beta = 0.22$, $p < .001$), coordination (high planning) ($\beta = 0.12$, $p < .05$; $\beta = 0.16$, $p < .001$), commitment (high persistence) ($\beta = 0.09$, $p < .05$; $\beta = 0.08$, $p < .05$), composure (low anxiety) ($\beta = 0.63$, $p < .05$; $\beta = 0.59$, $p < .001$), and control (low uncertain control) ($\beta = 0.11$, $p < .05$; $\beta = 0.27$, $p < .01$) that significantly contribute to the prediction of both academic resilience and academic buoyancy respectively (Martin et al., 2010; Martin & Marsh, 2006).

A further consideration regarding these constructs is that the terms academic resilience and academic buoyancy have been used interchangeably by Martin and Marsh throughout their research literature, making the claim of separate concepts unlikely and unclear. It seems probable that a construct that enables coping with low level academic adversity (i.e., buoyancy) would precondition a student to better deal with more chronic or acute academic adversity (i.e., resilience). Academic buoyancy has been suggested by Martin

and Marsh (2009) to be a necessary predictor of academic resilience, however, they note it does not have the ability to predict major adverse outcomes associated with academic resilience. A student who is academically buoyant is proposed to be better equipped to deal with major adversities, reflecting a hierarchical framework, where academic buoyancy predicts academic resilience which then predicts outcomes (Martin, 2013). Academic buoyancy and academic resilience are proposed by Martin (2013) to be independent constructs, inasmuch that academic resilience mediates the indirect effect of academic buoyancy on major maladaptive outcomes, but does not influence its direct effect on low-level impeding outcomes.

Evidence provided to date for the difference between academic resilience and academic buoyancy has been restricted to research conducted solely with ARS and ABS, and their related scale, the MES (Martin, 2013). Confirmatory factor analyses (CFA) were independently conducted on the ARS and ABS to confirm the existence of a relationship between the survey item scores and the underlying latent constructs; academic resilience and academic buoyancy. Firstly, Martin and Marsh (2006) analysed ARS results from 402 high school students, along with their self-reported data from the MES and measures of enjoyment of school, class participation and general self-esteem. They ran a one-factor CFA which showed high congeneric loadings for all items on the scale, ranging from 0.62 to 0.86. Martin and Marsh (2006) also found the overall model fit well for the hypothesised factor (CFI = 0.98). Further, they conducted a path analysis to determine the respective contributions of five motivation and engagement factors, derived from the MES, to academic resilience. All five factors, including self-efficacy, planning, persistence, anxiety and uncertain control, were significant predictors of academic resilience (Martin & Marsh, 2006). Secondly, Martin and Marsh (2008b) analysed ABS results from 3450 Australian high school students, along with self-reported data from the MES and measures of enjoyment of school, class

participation, positive intentions, homework completion and days absent from school. They conducted a one-factor CFA which found the overall model to be a good fit for the hypothesised factor (CFI = 0.96), and showed high congeneric loadings for all items on the scale ranging from 0.66 to 0.75. Further, Martin and Marsh (2008b) also conducted structural equation modelling (SEM) to confirm that academic buoyancy was significantly predicted by the four higher-order factors of the MES. They found all factors (adaptive cognitions, adaptive behaviours, impeding/maladaptive cognitions, and maladaptive behaviours) to be significantly associated with academic buoyancy (Martin & Marsh, 2008b). From these analyses the ARS and ABS are considered to be valid from a within-network perspective (Martin & Marsh, 2006, 2008b). However, as a CFA has not been conducted using both the ARS and ABS, there is no confirmation as to whether a one- or two- factor model is more suitable for representing their associated overlapping items. Martin (2013) has acknowledged the similarity in items on the ARS and ABS, and noted that this results from the two constructs being derived from different aspects of the same overarching framework, measured by the MES. Although this leads to overlap in their use and understanding, Martin (2013) maintains academic resilience and academic buoyancy to be distinct constructs.

The ARS, ABS and MES have been used extensively by researchers and implemented into various educational contexts in order to differentiate between the types of academic adversity students face, measure the level of resilience or buoyancy needed to overcome these, and assess the key factors of motivation and engagement in relation to student performance (Liem & Martin, 2012). It is important to make the distinction between academic resilience and buoyancy for both theoretical and practical reasons. At a theoretical level, if academic resilience and academic buoyancy are distinct constructs, as proposed by Martin, then the theoretical framework and related literature will be supported so that they can be treated and used as independent of one another. However, if the constructs are found

to be indistinct, results of a large number of studies will need to be re-evaluated in terms of their value and use in the general academic population. Additionally, from a practical viewpoint, if academic resilience and academic buoyancy are found to only differ in magnitude rather than type, more holistic assessments and interventions that look at the global picture, rather than those that target resilience or buoyancy independently, could be developed. These interventions could take on a hierarchical dimension to reflect the support that being academically buoyant gives to those who also need to be academically resilient.

In reviewing previous literature that has focused on validating these scales, it is clear that there is an absence of independent, pre-validated scales incorporated into the study designs, which are vital to conducting construct validity. Previous validation studies have solely used the measures in question (i.e. the ABS, ARS and MES) which cannot be used in isolation to confirm whether a scale is reliable or measuring the construct it is intended to measure. This is because construct validity requires a construct, such as academic resilience, to have established relationships with other variables that it theoretically should be associated with, either negatively, positively or to no extent (Westen & Rosenthal, 2003). This failure to externally validate Martin and Marsh's (2006, 2008a) measures of academic resilience, and academic buoyancy, and Martin's (2009) student motivation and engagement has occurred despite the existence of other validated measures that have been developed by researchers which tap into similar constructs. An example of these alternate measures is the Academic Resilience Scale 30 (ARS-30) (Cassidy, 2016), which measures academic resilience on the basis of students' cognitive and behavioural responses to adversity, and the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, & McKeachie, 1991), measuring student motivations and use of specific learning strategies to achieve academic goals. Similarly, researchers evaluating the ARS, ABS and MES have not incorporated measures of divergent validity. This may be due to researchers commonly

employing measures of divergent validity focusing on anxiety, stress and depression, which underpin academic resilience, academic buoyancy, and motivation and engagement, therefore rendering them inappropriate for in this context. However, one construct that is independent of academic buoyancy, academic resilience, and motivation and engagement in academic contexts is attachment style. The revised Adult Attachment Scale (ASS-r) (Collins, 1996) is one such method of assessing attachment through measuring attitudes related to attachment. Consequently, this includes how close a person feels to their partner, how fearful they are of losing their partner and how much a person is able to rely on others.

The present study

The purpose of the present study is to address gaps in the research literature in regards to the reliability and validity of the ARS, ABS and MES-UC. To date, the construct validity analyses regarding the ARS, ABS and MES-UC have been restricted to these measures alone, disregarding a true construct validity approach that requires correlating them with independent measures that are theoretically similar or distinct (Martin, 2007; Martin, Malmberg, & Liem, 2010; Martin & Marsh, 2006). The study focuses on a sample of university students, as relatively few studies have looked at the constructs of academic resilience, academic buoyancy and motivation and engagement in this population. However, these constructs are vitally important for university students as they are constantly dealing with pressures and difficulties of high level academic demands (e.g. competing deadlines for assignment and exam stress) and the repercussion that may come with failure (e.g. lacking the required mark for entry into a desired course or career).

The first aim of this research was to examine whether the scales for academic resilience and academic buoyancy, developed by Martin and Marsh (2009), can be empirically distinguished, or whether they reflect varying magnitudes of the same underlying construct. It was hypothesised that the two constructs would share a strong, positive

correlation. It was also hypothesised that chronic stressors would demonstrate a strong positive correlation with academic resilience and a weak positive correlation with academic buoyancy. Additionally, it was hypothesised that there would be a strong positive correlation between everyday setback factors and academic buoyancy, and a weak positive correlation with academic resilience. Considering the previous hypotheses, it was hypothesised that academic resilience would mediate the relationship between academic buoyancy and major maladaptive outcomes, but have no effect on the relationship between academic buoyancy and low-level outcomes. Finally, it was hypothesised that, as the ARS and ABS have overlapping items, the 6 scale items would be better represented by a one-factor model.

Additionally, this study sought to determine whether the ARS, ABS and MES-UC are valid measures and whether each individual scale can effectively measure their corresponding constructs of academic resilience, academic buoyancy, and motivation and engagement respectively. Convergent validity was assessed through the use of independent previously validated scales including the 30 item ARS-30 (Cassidy, 2016) and the MSLQ (Pintrich et al., 1991). Additionally, the AAS-r (Collins, 1996) was used to measure divergent validity, to ensure concepts that are not supposed to be related are in fact unrelated. It was hypothesised that the ABS and ARS would both have strong positive correlations with the ARS-30 (Cassidy, 2016), with those items relating to daily struggles correlating higher with the ABS, and those relating to chronic stressors correlating higher with the ARS. It was also hypothesised that the MES-UC would have a strong positive correlation with the MSLQ (Pintrich et al., 1991). Finally, it was hypothesised that the ARS, ABS and MES-UC would all have weak to no correlation with the AAS-r (Collins, 1996).

Method

Participants

The total sample comprised 761 university students (575 females, 186 males) who completed the ARS and ABS, a subset of whom (44; 26 females, 18 males) completed further scales including the MES-UC, MSLQ, ARS-30, and AAS-r. The age range of the total sample was 18 to 66 years (M = 23.5, SD = 8.05). Participants were recruited through advertisements placed around the University of Tasmania, through the SONA online research recruitment platform and in lecture slide advertisements by University lecturers. Additional recruitment through Facebook was also conducted. University students over the age of 18 were invited to take part in the study, with no further applicable exclusions. This participant population was selected as the study aimed to validate the scales of academic resilience, academic buoyancy and motivation and engagement in university students. A G*Power analysis recommended at least 220 participants to detect a moderate-large effect size.

Materials

The assessment battery consisted of the following scales:

Demographic Variables: Information pertaining to age, sex, ethnicity, English as a second language, degree, majors, previous degrees completed, year level of current degree, and study load will be obtained. Additionally, a series of questions based on research by Martin and Marsh (2009) were developed by researchers to assess the experience of chronic stressors and everyday setbacks proposed by Martin and Marsh (2009) to load on to either academic resilience or academic buoyancy respectively.

The Academic Resilience Scale (ARS): The ARS (Martin & Marsh, 2006) measures academic resilience using 6 items rated on a 7-point Likert scale from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). These items are operationalised to reflect a student's ability to deal

with acute and/or chronic adversity (e.g. “I believe I’m mentally tough when it comes to exams”) (Martin, 2013), with higher scores indicating a higher level of academic resilience

Academic Buoyancy Scale (ABS): The ABS (Martin & Marsh, 2008a) measures academic buoyancy using 4 items rated on a 7-point Likert scale from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). These items are considered to look at how students deal with everyday hassles and setbacks that may occur in their studies (e.g. “I think I’m good at dealing with schoolwork pressures”), with higher scores indicating higher levels of academic buoyancy.

The Motivation and Engagement Scale – University/College (MES-UC): The MES-UC (Martin, 2009) assesses 11 facets using 44 items rated on a 7-point Likert scale from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). The 11 facets can be broken down into 4-sub categories of adaptive cognition (self-efficacy, mastery orientation and valuing), adaptive behaviour (persistence, planning and task management), impeding/maladaptive cognition (uncertain control, failure avoidance and anxiety), and maladaptive behaviour (disengagement and self-handicapping) with higher scores indicating a higher level of cognition or behaviour.

The Motivated Strategies for Learning Questionnaire (MSLQ): The MSLQ (Pintrich et al., 1991) is a 15 subscale, 81-item scale which assesses students use of different learning strategies and motivation orientation. Six subscales relate to motivation (e.g. task value, control beliefs and test anxiety) and 9 relate to learning strategies (e.g. critical thinking and self-regulation), with higher scores indicating a higher level of the subscale being measured.

The Academic Resilience Scale – 30 (ABS-30): The ARS-30 (Cassidy, 2016) is a 30-item scale developed to evaluate resilience in students from their responses to academic adversity, with students responding on a 5-point Likert scale ranging from 1 (*likely*) to 5 (*unlikely*). The items are phrased positive or negative and behavioural or cognitive-affective (e.g. “I would probably get annoyed” or “I would seek help from my tutors”). Students

respond after reading a vignette describing an academic adversity where they are to imagine themselves as the individual portrayed in the adversity, with higher global scores (range 30-150) indicating a greater level of academic resilience.

The Revised Adult Attachment Scale (AAS-r): The AAS-r (Collins, 1996; Collins & Read, 1990), is an 18-item scale rated on a 5-point Likert scale from 1 (*not at all characteristic*) to 5 (*very characteristic*) with items relating to each of the three adult attachment style. Depend indicates how much an individual feels they can depend on others (e.g. "I am comfortable depending on others"). Anxiety indicates how much an individual will be worried about abandonment (e.g. "I often worry that romantic partners won't want to stay with me"). Finally, Close indicates how much an individual is comfortable in being intimate and close with others (e.g. "I find that other are reluctant to get as close as I would like"). Higher scores indicate higher levels of the attachment style it correlates with.

Procedure

Access to the questionnaire was available to university students through an electronic link to an online survey. Participants read through an online information sheet that preceded the survey to give them an understanding of the method, purpose and possible outcomes from the research before proceeding to the survey where they completed the assessment battery. Consent was implied through the submission of completed survey responses. The survey was expected to take participants around 60 minutes to complete. Participants who completed the survey could either choose to gain course credit (60 minutes for first year psychology students) or enter the draw to receive one of six $50 Coles/Myer vouchers.

Design and analysis

The study used a cross-sectional correlational design. Firstly, correlational analyses were used to assess the relationship between participants mean scores on measures of

academic resilience and academic buoyancy as measured by the scales developed by Martin and Marsh (2006, 2008a). Convergent validity was assessed by examining the correlations between the ARS, ABS and ARS-30, as well as between the MES-UC and MSLQ. Finally, divergent validity was assessed by examining the correlations between the ARS, ABS, MES-UC and the AAS-r. All correlational analyses were examined using the statistical package Jamovi version 1.1.0 (The Jamovi Project, 2019).

Confirmatory factor analysis (CFA) was then conducted, using the statistical package Mplus version 8.3 (Muthén & Muthén, 1998-2017), to test the whether the ARS and ABS were better considered as reflecting two separate constructs, as is currently the case, or one underlying construct. To do this both a one-factor and two-factor model were analysed and compared. Due to the ARS and ABS having 4 overlapping items, the scores on these items for each individual scale were identical for the analysis. Items for each scale must be entered individually, regardless of overlap, in order for the analysis to run. Each shared item was included twice in the two-factor model analysis, corresponding to the item on either of the two scales. For example, item 2 on the ARS is identical to item 1 on the ABS and hence was included as ARS2 and ABS1 in the CFA syntax. This also applied to item 4, 5 and 6 of the ARS which corresponded to item 2, 3, and 4 on the ABS respectively.

Discriminant function analysis was then used to determine whether the demographic factors (i.e. age, sex, ethnicity, chronic stressors, everyday setbacks) measured could be used to predict academic resilience or academic buoyancy group membership. The discriminant function analysis was examined using the statistical package SPSS (IBM corp, 2016).

Finally, it was intended that a mediation analysis would be used to explore whether academic resilience mediated the indirect effect of academic buoyancy on major maladaptive outcomes. However, this analysis could not be run due to the almost perfect correlation between the mediator variable, academic resilience, and the independent variable, academic

buoyancy. Having highly correlated mediator and independent variables causes a significant decline in statistical power of the test due to increases in the relevant coefficient and effect size (Beasley, 2014).

Results

Participants reported moderate levels of academic resilience and academic buoyancy, as shown by means reported in Table 1. A correlational analysis was used to determine the relationship between academic resilience and academic buoyancy, as measured by the ARS and ABS. The relationship between the ARS and ABS, presented in Table 1, was strong, positive, and significant.

Table 1

Correlations, Means and Standard Deviations for the ARS and ABS (N = 761)

Scale	1	2	*M*	*SD*
1. Academic Resilience	-		4.04	1.32
2. Academic Buoyancy	0.98**	-	3.89	1.38

*=p<.05, **=p<.001

Discriminatory factor analysis

Discriminant function analysis was conducted to predict group membership for academic resilience and academic buoyancy using the baseline adversity factors measured. The discriminant function indicated that the group means were statistically significantly different from one another and that the function model had a moderate, significant fit, Λ = .593, χ^2 (10, N = 44) = 19.34, p = .036. An eigenvalue of 0.686 suggests the discriminant function explains a moderate amount of variance in group membership for either academic

resilience or academic buoyancy. A significant association between groups was found with all baseline adversity factors accounting for 40.7% of between-group variability.

The structure matrix, presented in Table 2, revealed the strongest baseline adversity variables for academic resilience and academic buoyancy were physical or mental ill health and overwhelming feelings of anxiety. Cross validated classification showed that overall 35.3% were correctly classified with academic resilience, and 81.5% were correctly classified with academic buoyancy. Overall 63.6% of cross-validated grouped cases were correctly classified.

Table 2

Discriminant Function Structure of Baseline Adversity Factors (N = 44)

Variable	
Physical or mental-ill health	.860
Overwhelming feelings of anxiety	.791
Consistently receiving low grades	.565
Stress	.519
Lack of social support	.469
Alienation	.417
Low motivation	.383
A learning disability	.371
A physical disability	.309
First in family to attend university	.282

Convergent validity

To evidence and explore convergent validity of the ARS and ABS, with consideration of other related and independently validated scales, the correlations between these two scales and scores on the ARS-30 were analysed. The ARS-30 showed a non-significant extremely weak correlation with the ARS, $r(44) = .017$, $p = 0.914$, as shown in Figure 3. Similarly, the ARS-30 showed a non-significant weak correlation with the ABS, $r(44) = .010$, $p = 0.473$, as shown in Figure 4. These results demonstrate no convergent validity between those measurements from the ARS and ABS and those from the ARS-30.

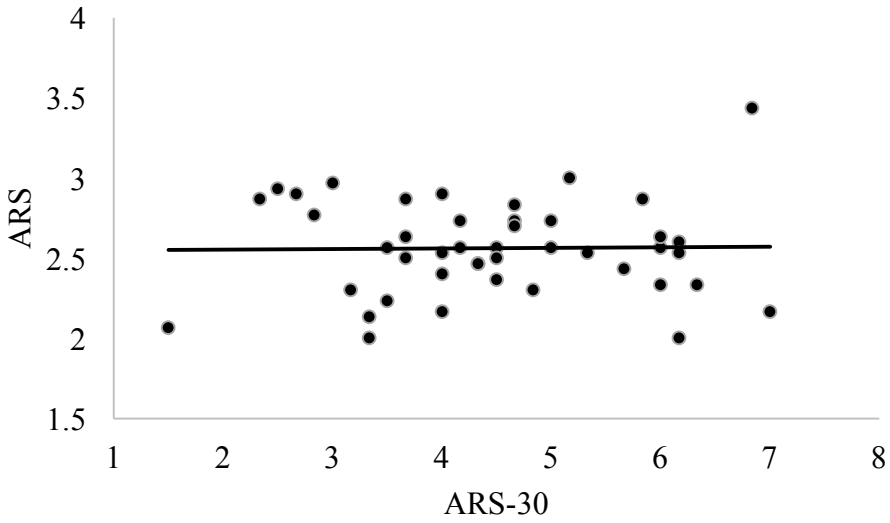

Figure 2. Correlation between the Academic Resilience Scale and the Academic Resilience Scale 30.

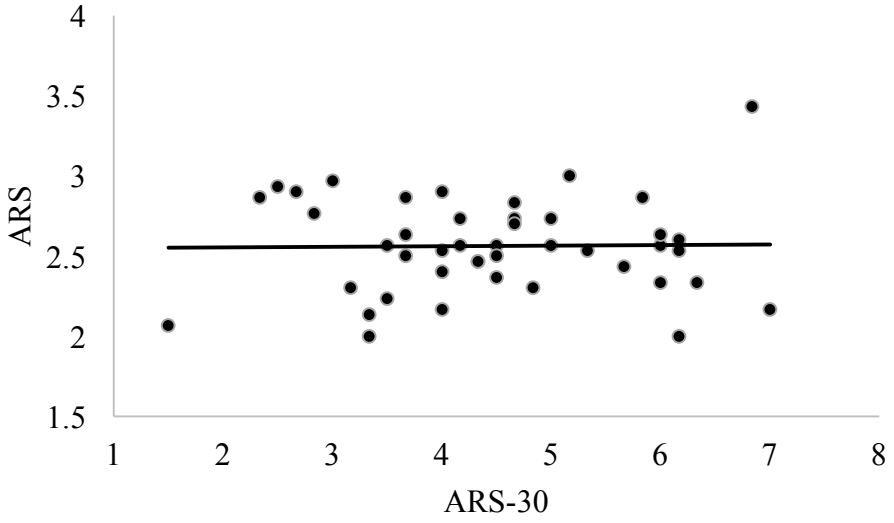

Figure 3. Correlation between the Academic Buoyancy Scale and the Academic Resilience Scale 30.

Additionally, convergent validity of the MES was analysed using correlations with the related and independently validated scale, the MSLQ. The MSLQ showed a significant moderate positive correlation with the MES. The correlation is shown in Table 3 and demonstrates good convergent validity of the measurements from the MES and those from the MSLQ.

Table 3

Correlations for Convergent Validity between the MES and MSLQ (N = 44)

Scale	1	2
1. MES	-	
2. MSLQ	.502**	-

*=p<.05, **=p<.001

Divergent validity

To evidence and explore divergent validity of the ARS, ABS and the MES, with consideration of an unrelated and independently validated scale, the correlations between each of these three scales and the ASS-r were analysed. The ASS-r showed a weak, positive significant correlation with the MES, and weak, negative, non-significant correlations with both the ARS and the ABS. The correlations are shown in Table 4 and demonstrate sufficient divergent validity of the measurements made from the ARS, ABS and MES, and those made from the ASS-r.

Table 4

Correlations for Divergent Validity between the ARS, ABS, MES and AAS-r (N = 44)

Scale	ARS	ABS	MES
ASS-r	-0.14	-0.19	0.35*

*=p<.05, **=p<.001

Confirmatory factor analysis

Prior to conducting confirmatory factor analysis, the data was determined suitable to be factorised by way of Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) test. The KMO test showed an optimal value of 0.883 and Bartlett's test of sphericity was significant, $\chi^2(15) = 3207.9$, p <.001. Reliability analysis was also examined, with cronbach's alpha values for all six items above 0.890.

CFA demonstrated the difference in model fit indices of the one- and two-factor models tested, shown in Table 5. To allow CFA to be conducted the items from the ARS and ABS were coded in a way that the four overlapping items appeared twice in the analysis,

showing identical item scores for each participant, resulting in an overall ten item analysis. The two-factor model showed a significantly better fit for the ten items, χ^2change(1) = 22.1, p<0.001. However, the chi-square value was not a reliable measure of model fit as it is extremely sensitive to the large sample size, and a trivial effect in a large sample can manifest a significant difference (Vandenberg, 2006). Regardless of this, when the values of all model fit indices are compared they appear almost identical. Considering their similarities and overlapping factors the results are more supportive of a one-factor model representing the six items that make up the ARS and ABS.

Table 5

Confirmatory Factor Analysis Model Fit Indices (N = 761)

Criteria	One-factor	Two-factor
Chi-square (df)	1339.2 (35)	1317.1 (34)
P-value	<.001	<.001
RMSEA (90%CI)	0.221 (0.211, 0.232)	0.223 (0.212, 0.233)
CFI	0.955	0.956
TLI	0.942	0.941
WRMR	2.65	2.65

Discussion

The current study aimed to explore whether academic resilience and academic buoyancy, as measured by their corresponding scales developed by Martin and Marsh (2006, 2008a), were able to be empirically differentiated in a sample of university students. Further, this study sought to examine the construct validity of the ARS, ABS and MES-UC, by

evaluating their relationships with previously validated scales for convergent validity, namely the ARS-30 and MSLQ. The ARS-30 measures the similar construct of academic resilience as the ARS and ABS, and the MSLQ measures similar constructs of motivation and engagement as the MES-UC. Additionally, the previously validated AAS-r was used for divergent validity, as its construct measurement of adult attachment styles is considered dissimilar to all three scales. Discriminant function analysis was additionally evaluated to determine if theorised baseline adversity factors could discriminate between group membership of academic resilience or academic buoyancy. Finally, CFA was tested for the ARS and ABS to establish whether their combined scale items, of which four items comprising the ABS completely overlap with items on the ARS, would better fit a one-factor model compared to the current two-factor model.

Difference between academic resilience and academic buoyancy

Firstly, it was hypothesised that the correlation between academic resilience and academic buoyancy would be strong and positive. Evidence from a correlational analysis of the total sample demonstrated this was the case, with the two constructs having an almost perfect significant positive correlation. These results suggest the ARS and ABS are not representing different constructs, as claimed by Martin and Marsh (2009), or at the very least are unable to be differentiated from one another in terms of the constructs they represent. This relationship was expected, as within the six items comprising the ARS, a subsample of four comprise the total ABS. Consequently, upon examination of the two ARS items not shared with the ABS, it became apparent these were unable to further distinguish between the constructs. For example, the ARS exclusive item '*I'm good at bouncing back from a poor mark in my schoolwork'*, is more suggestive of academic buoyancy than resilience. It emphasises adapting to everyday adversity of setbacks and challenges experienced by university students, which would be suitable for the ABS scale, as academic buoyancy details

dealing with poor school grades (Martin & Marsh, 2008a). Additionally, the ARS exclusive item *'I believe I'm mentally tough when it comes to exams'* does not differentiate in relation to major maladaptive adversities which specifically apply to academic resilience, or to students who need to be mentally tough to overcome the everyday stress of exams which would apply to academic buoyancy.

In examining academic resilience and academic buoyancy within the sub-sample, consistent with the theory posed by Martin and Marsh (2009), it was hypothesised academic resilience would show a strong positive correlation with chronic stressors and a weak positive correlation with everyday setback factors. In contrast, it was hypothesised academic buoyancy would have a weak positive correlation with chronic stressors and a strong positive correlation with everyday setback factors. To analyse this, participants were asked additional baseline adversity questions on their experiences with chronic stressors (i.e. a learning disability) and everyday setbacks (i.e. low motivation). These questions allowed a further evaluation of theoretical differences claimed to distinguish between academic resilience and academic buoyancy (Martin & Marsh, 2009). For instance, Martin and Marsh (2009) claim vulnerable student populations who are able to successfully overcome threats to their educational development in the form of high-level academic adversity, such as being first in family to attend university, are academically resilient. In contrast, they also claim the majority of students who experience and successfully overcome everyday academic adversities, such as competing deadlines and poor grades, are academically buoyant (Martin & Marsh, 2009).

The additional questions included 10 baseline adversity measures, either reflecting acute and chronic academic adversity or everyday low-level academic adversity. The factors that are theoretically more predictive of academic resilience included: a learning disability, a physical disability, alienation, being first in family to attend university, lack of social support,

physical or mental ill health, and consistently receiving low grades. It was expected these factors would be more strongly correlated with academic resilience, as measured by the ARS, than academic buoyancy. In contrast, factors more predictive of academic buoyancy, low motivation, overwhelming anxiety related to university, and stress, were expected to be more strongly correlated with academic buoyancy, as measured by the ABS, rather than academic resilience. Correlational analyses contradicted these predictions, revealing the baseline adversity factors had significant moderate correlations with academic resilience, as well as displaying significant moderate correlations with academic buoyancy. Four adversity factors, including low motivation, physical or mental ill health, overwhelming anxiety, and stress, were found to have similar moderate, negative, and significant correlations with academic resilience and academic buoyancy alike. The remaining six adversity factors were not significantly correlated with either academic resilience and academic buoyancy, however for each of the 10 adversity factors, the *r*-values, reflecting the correlations, were almost identical for both academic resilience and academic buoyancy. This finding supports the initial proposition posed in the rationale of the current study, evidencing academic resilience and academic buoyancy are unable to be differentiated as measuring separate constructs, and instead, may measure different levels of the same construct.

Further, discriminant function analysis was conducted using the sub-sample to determine which of the 10 baseline adversity factors were best able to discriminate group membership of those who were academically resilient or academically buoyant. The most significant predictors of group membership were physical or mental ill health and overwhelming feelings of anxiety. In contrast, the baseline adversity factors that had the least significance in predicting group membership were a physical disability and being the first in family to attend university. This may be attributed to the small sub-sample, where individuals may not have experienced either of these two major academic adversities. Considering the

correlations between academic resilience and baseline adversity factors were almost identical to the correlations with academic buoyancy, it is unlikely there will be a significant difference between the groups to justify the need to discriminate membership. Moreover, if they are found to measure the same underlying construct, the discriminant function will contribute more to determining what level of the construct students are experiencing, rather than whether they are experiencing it at all or not.

Determining model fit

Confirmatory factor analysis (CFA) for the ARS and ABS was explored in order to verify item factorability and refine the models, including the four overlapping items, in terms of their combined scale items. It was hypothesised the combined items of these scales would be better represented by a one-factor model, rather than the current two-factor model. CFA of the total sample supported this hypothesis. Due to the high overlap of items between the two scales, it was found, as expected, the model fit indices would be exceedingly similar, implying very little difference between a one-factor and two-factor model. Although the difference in overall fit was significant, the change in chi-square statistic is extremely sensitive to sample size, meaning a trivial effect can easily be manifested as significant (Kyriazos, 2018; Singh, 2009). Additionally, choosing a model because of its greater model fit indices alone, such as the two factor model described here, is of limited use if the model itself is overly complex (Preacher, Zhang, Kim, & Mels, 2013). In this case, it was more appropriate to retain the simpler one-factor model, especially due to the negligible difference between the model fit indices and the overlap in scale items. Overall, a one-factor model was favourable for the six combined items originally contributing to the ARS and ABS.

ARS, ABS and MES-UC construct validity

To further examine the construct validity of the ARS, ABS and MES-UC, both convergent and divergent validity were assessed. Convergent validity was assessed first, hypothesising the ABS and ARS would have strong positive correlations with the ARS-30, a similar, previously validated measure of academic resilience. Contradictory to this hypothesis, both ARS and ABS were found to have no correlation with the ARS-30. This suggests that the ARS and ABS are not accurate measurements of the construct of academic resilience, at least as it is measured by the ARS-30. Additionally, it was hypothesised the ARS and ABS would have weak to no correlation with the AAS-r. The analysis outcome supported this hypothesis, with both scales showing non-significant, weak and negative correlations. This suggests that the ARS and ABS were in fact measuring a different construct to the AAS-r. Considering the result of both convergent and divergent validity for the ARS and ABS, it is evident further research is needed to ascertain and define the construct or constructs that the ARS and ABS are reflective of.

Convergent validity was also examined for the MES-UC using a comparable, previously validated scale, the MSLQ, which measures similar constructs of motivation and engagement. It was hypothesised the MES-UC would show a strong positive correlation with the MSLQ. The MES-UC was found to have only a moderate, although still significant, positive correlation with the MSLQ. Additionally, it was hypothesised the MES-UC would have weak to no correlation with the AAS-r. The results of this analysis supported the hypothesis, as the MES was found to have a significant, positive, but weak correlation with the AAS-r. The significance of the correlation may be attributed to the similarity between the impeding cognition subscale of the MES-UC, measuring academic anxiety, and the AAS-r subscale which measures attachment anxiety. For example, the MES-UC item *'When I have a project to do, I worry about it a lot'* from the impeding cognition subscale measures

academic anxiety (Liem & Martin, 2012). Similarly, the AAS-r item *'I often worry that romantic partners don't really love me'* from the anxiety subscale measures attachment anxiety (Collins, 1996). Although they are measuring different domains of anxiety, it is likely there is latent anxiety contributing to individual's responses both on the MES-UC and the AAS-r. However, due to the weak correlation, it is negligible even when showing a significant result. Both convergent and divergent validity for the MES-UC sustain it as a relatively reasonable scale for the measurement of motivation and engagement. For future research, it would be beneficial to gain further construct validity support for the MES-UC using a larger sample, before it is used further in research and educational assessments.

Further implications

Research in the area of academic resilience and academic buoyancy has been predominantly undertaken by Martin and Marsh. The current study used different methods, such as the use of pre-validated scales, to further investigate the constructs of academic resilience, academic buoyancy and motivation and engagement. The valuable and unique contribution made by the current study addressed some of the existing deficits within the academic resilience literature, specifically towards distinguishing between academic resilience and academic buoyancy. Their related scales, the ARS and ABS, have been extensively used by researchers and through various levels of educational assessment, thus determining whether they are able to be distinguished from one another has both theoretical and practical implications.

Theoretically, academic resilience and academic buoyancy were determined within the current study to reflect similar, if not identical, constructs that were unable to be empirically distinguished from one another. Due to this, the theoretical model developed by Martin and Marsh (2001), and the prevailing literature around their conceptualisations and measurement of academic resilience and academic buoyancy, will need refining due to the

absence of empirical support for the existing interpretation. Additionally, as the theory and assessment tools developed by Martin and Marsh have been used and cited extensively, those study results will need to be re-evaluated in terms of their value and use in general academic populations. It would be beneficial for these revisions to occur before the scales are used further as educational assessment tools or in research.

Practically, clarification of the ARS and ABS is required, as the differences observed between them through all analyses were minimal. This can be attributed to the overlapping items which cause the ABS to be comprised solely from a subset of items on the ARS. To combat this redundancy, a single global scale could be developed by combining the ARS and ABS, as suggested in the CFA. This global academic resilience scale would be beneficial for assessments as different scale results will reflect differing levels of the construct. For example, high scale scores could be attributed to academic resilience and low scale scores to academic buoyancy, as defined by Martin and Marsh (2009). Additionally, this global scale would be beneficial for assessments and interventions to determine those students who are resilient or buoyant, and consequently promote favourable outcomes for students in the area of growth they need. Due to the proposed difference in magnitude between academically resilient and academically buoyant students, the intervention would need to be tailored in intensity for different students. For example, a student with low resilience will require an intervention of greater intensity to achieve the same positive outcomes as a student who is already highly resilient. However, as the ARS and ABS do not correlate with the ARS-30, it is unlikely they measure a similar construct of academic resilience. Academic resilience and academic buoyancy, as determined by Martin and Marsh (2006, 2008a), are theoretically based in the MES-UC framework. Therefore, it may be plausible they measure constructs similar to those from this scale. For example, Martin (2013) indicates academic resilience reflects major maladaptive factors linked to the MES-UC subscale, maladaptive behaviours,

measuring self-handicapping and disengagement. Additionally, academic buoyancy reflects low-level impeding factors linked to the MES-UC subscale, impeding cognitions, measuring failure avoidance, anxiety and uncertain control (Liem & Martin, 2012; Martin, 2013). Considering the MES-UC subscales tapped into, the ARS and ABS may be measuring constructs more relevant to academic coping strategies than academic resilience and academic buoyancy. Regardless, until there is clarity over the construct or constructs measured by the ARS and ABS, the development of a global scale will not be a sufficient solution to their inability to be empirically distinguished

Limitations and directions for future research

In considering the above findings and providing research directions for the future, it is important to acknowledge there are several limitations to this study. Participants provided data that was solely self-reported, and as such, may have suffered from positivity bias and reporting in a self-protective manner (Fulmer & Frijters, 2009). In acknowledging this, the subjectivity of question responses was desirable for this study as the constructs being measured, including academic resilience, academic buoyancy, and motivation and engagement, were all related to the individuals' self-perceptions and interpretations. Nevertheless, the validity of self-report data relies on the honest and accurate appraisals of students, without over amplifying or under acknowledging the extent to which they experience feelings associated with the constructs being measured. Additionally, it is likely responses were inconsistent due to differences in individual interpretation of both the scale items and the response options (Fulmer & Frijters, 2009). The majority of the study utilised Likert scale data, criticised for conceptually inaccurate scoring, as individual interpretation differences could easily contribute to the selection between scores (Fulmer & Frijters, 2009). For example, someone who reported high levels of stress may be experiencing similar levels to someone who reported moderate levels due to different self-interpretation, knowledge, or

understanding of the question. Further, all administered scales used uneven Likert scales (i.e. 1-7) providing participants with a middle or neutral score which could reflect a number of interpretable responses (i.e. indecisive, lack of opinion, impartial etc.) (Fulmer & Frijters, 2009). To combat these limitations, future research may consider obtaining additional methods of data collection, including interviews and observations, to support the Likert scale self-reported data. Multi-dimensional approaches allow for a greater understanding of complex constructs and more objective measures of individual responses, supplementing the use of Likert scale data and further validating self-reported experiences (Fulmer & Frijters, 2009).

Another limitation of the study was the possibility of participants not having fully engaged in the survey during completion. Some participants may have been more concerned with receiving 60 minutes course credit (for first year psychology students) or the $50 Coles/Myer voucher, than the importance of providing quality data. As it could be completed at a time and place of their choosing, potential distractions and contributing factors, such as noise or fatigue, may have caused them to miss important construct factors in their results or lose concentration while completing the test battery. Future studies should look into completing the survey in a controlled environment in order to hold environmental distractions constant for all participants. Additionally, the participant sample utilised in the current study was not constrained by exclusion criteria, other than the need to be enrolled and attending university at the time of survey completion. Future studies may need to involve stricter samples, as academic resilience can only be measured in the presence of major academic adversity, therefore those eligible to answer the resilience questionnaire must have experienced this (Martin, 2013).

The current study employed a cross-sectional design, with participants completing the questionnaire only once during their academic year without future follow up of their results.

Some participants may have completed the survey at the beginning of a semester before any effect of assignment or exam stress is seen, where others may have completed it during their busiest week of assignment deadlines, or during the mid-semester exam period, with significant stress. These various time points create vast differences in student pressure and stress levels which would have contributed to each individuals' reflection of their self-reported resilience, buoyancy, motivation and engagement. Future researchers may wish to employ a longitudinal design in such studies, with set time points for survey completion, to measure how stable the constructs are over time. This will aid in the current understanding of how student's motivation, engagement, resilience and buoyancy persist over the academic year and further into their degrees.

Finally, an important limitation of the current study is the sub-sample utilised for a number of the analyses, excluding the correlation between academic resilience and academic buoyancy, and the CFA, was underpowered. This may be problematic as the sampling distributions for the sample estimates have the potential to be considerably broad, with all parameters estimated differing substantially from that of the population (Crutzen & Peters, 2017). Low power can be a source of restrictions in interpreting data analyses. Firstly, the likelihood of finding a genuine effect is low as they produce more false-negatives than studies with high powered samples (Button et al., 2013). Secondly, a low powered study has lower probability of reflecting a true effect in the statistically significant observed effect. Lastly, if an underpowered study does find a true effect, the magnitude of that effect will likely be exaggerated (Button et al., 2013). Taking this into consideration, analyses using the underpowered sub-sample found significant convergent and divergent correlations for the MES-UC. Additionally, significant correlations were observed between baseline adversity factors and the ARS and ABS, suggesting both findings are robust and reflect true effects. As increasing sample size gives more power to statistical analyses, future research would benefit

from increased data points for the dimensions used in construct validity and discriminant function analyses (Maxwell, 2004). It is important to acknowledge the correlation between academic resilience and academic buoyancy was sufficiently powered, as was the CFA. These analyses alone provide sufficient support to the proposition that academic resilience and academic buoyancy are unable to be empirically distinguished in terms of the constructs they reflect, and instead may reflect differing levels of the same construct.

Conclusion

Stress, difficulties and adversities are experiences all students will face at some point during their education, especially at university. These adversities and the resilience needed to overcome them differs for each individual. Academic resilience is claimed to be associated with high level academic adversity, and deemed less applicable to general everyday academic adversities, which are associated with academic buoyancy. The main aim of this study was to determine whether academic resilience and academic buoyancy, as measured by the scales developed by Martin and Marsh (2006, 2008a), could be distinguished from one another. The results of the present analyses show very minimal differences between the scales and the constructs they reflect, suggesting they are likely to reflect similar, or indistinguishable constructs. As the ARS and ABS were found to be almost perfectly correlated, despite both reflecting no correlation to a pre-validated scale of academic resilience, it is uncertain what construct underlies them. Furthermore, the six combined items that comprise the two scales were found to be better represented by a one-factor model than the current two-factor model. These findings question the validity of the surrounding theoretical framework used to develop the constructs, its supporting literature, and measurement. Additionally, in analysing the measure of student motivation and engagement, developed from the same framework (MES-UC), it was found to be a relatively reliable scale for its respective constructs. It is important to first clarify the construct or constructs being measured by the ARS and ABS

before they are utilised for further research or assessments. Future research should explore the underlying constructs, especially considering the ARS and ABS are theoretically based in the MES-UC framework and are suggested to reflect MES-UC subscales. Once the underlying constructs are clarified, the exploration and development of a global scale could benefit future assessments and interventions for students with varying degrees of said constructs.

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Appendices

Appendix A: Total Sample Characteristics

Table A1

Total Sample Characteristics (N = 761)

Classification	Sub-group	*n*
Sex	Female	575
	Male	186
Country Born	Australia	661
	Other	100
Study Load	Full Time	648
	Part Time	113

Appendix B: Sub-sample Characteristics

Table 2A

Sub-sample Characteristics (N = 44)

Classification	Sub-group	*n*
Sex	Female	26
	Male	18
Country Born	Australia	42
	Other	2
Study Load	Full Time	42
	Part time	2
Year Level	1	9
	2	12
	3	8
	4	6
	5	6
	6	1
	Unspecified	2

Appendix C: Demographic Questions

Sex: _____

Age: _____

Ethnicity: _____

Is English your second language: Yes/No

Degrees completed: _____

What is your current degree: _____

What is/are your major/s: _____

Year of Study at University (for your current degree): _____

Part or Full Time Study: _____

Appendix D: Additional Questions

On a scale of 1(not at all) to 5(very much), how much do the following factors impact your performance at university?

	Not at all				Very much
A learning disability	1	2	3	4	5
A physical disability	1	2	3	4	5
Alienation	1	2	3	4	5
First in family to attend university	1	2	3	4	5
Lack of social support	1	2	3	4	5
Low motivation	1	2	3	4	5
Physical or mental-ill health	1	2	3	4	5
Overwhelming feelings of anxiety	1	2	3	4	5
Consistently receiving low grades	1	2	3	4	5
Stress	1	2	3	4	5

Appendix E: Participant Information Sheet

Academic Resilience, Academic Buoyancy and the Motivation and Engagement Scale: A Construct Validity Approach

PARTICIPANT INFORMATION SHEET

Research team *Dr. Kimberley Norris, Senior Lecturer in Psychology, University of Tasmania*

Kate Stephens, Psychology Honours student, University of Tasmania

1. Invitation

You are invited to participate in a research study investigating the theory of academic resilience and academic buoyancy and to determine if the way they are measured can be empirically validated. This study is being conducted by Kate Stephens, Psychology Honours Student, under the supervision of Dr Kimberley Norris, Lecturer, School of Psychology.

2. What is the purpose of this study?

This study aims to investigate whether academic resilience and academic buoyancy are two distinct constructs and validate the widely used scales of academic resilience, academic buoyancy and motivation and engagement. The results of this study could influence the use of these scales in future research, and may inform specific interventions for students struggling with developing academic resilience or with academic buoyancy.

3. How is the study being funded?

This study has a budget of $300 from the University of Tasmania to purchase any tools we need and to support participant incentives. Participants who complete the survey can either choose to gain 60 minutes course credit (for first year psychology students) or go in the chance to receive one of six $50 vouchers. The researchers declare no other financial or other conflicts of interest.

4. **Why have I been invited to participate?**

You are eligible to take part in this study because you are a university student over the age of 18 years. Your participation is voluntary and your choice to take part will not affect the services you receive from your university.

5. **What will I be asked to do?**

If you decide to participate in this study you will complete an online survey. This survey will include demographic and self-report questions about how you manage academic challenges, as well as a verbal reasoning task.. This survey will take approximately 45-60 minutes to complete.

6. **Are there any possible benefits from participation in this study?**

This study asks you to reflect on the ways that you deal with academic challenges which may provide insight into your management of these in your university studies. Upon completion of the survey first year psychology students studying at UTAS will receive 60 minutes course credit for participation or may choose to enter the draw to receive one of six $50 vouchers. All other participants will have the choice to enter the draw to receive one of six $50 vouchers by following the link provided at the end of the survey.

This study will help confirm the validity of three widely used measures in the area of educational psychology. The results may help shape recommendations for future research potentially using these measures. It may also contribute to developing tailored interventions for students struggling with either academic resilience or academic buoyancy.

7. **Are there any possible risks from participation in this study?**

This research poses no more than minimal risk. The only foreseeable ethical considerations are that of potential inconvenience due to the time it will take for the survey and the potential

discomfort of sitting and concentrating for an extended period of time. To address this, you may save your progress and return later to complete the survey if you wish.

8. What if I change my mind during or after the study?

Your participation is voluntary and you are free to withdraw from this study at any time prior to submitting your survey without penalisation or having to provide an explanation. If you wish to withdraw please stop completing the survey and exit the browser tab. Your data will be removed from the study should you decide to withdraw prior to completion. Once your responses have been submitted there is no way to identify or remove them as the survey is anonymous.

9. What will happen to the data when this study is over?

Data collected as part of the survey will be non-identifiable, as you will not be asked to provide any information by which you could be identified. It will be stored on password-protected cloud storage through the University of Tasmania. The only people with access to this data will be the research personnel. The results of this study will be published upon completion, however no participants will be identified in the publication of results.

10. How will the results of the study be published?

All data reported in publications based on this study will be anonymous. There will be no way for anyone to know whether you have or have not participated in the study as we will not be asking for any identifiable information from you. The data from this study will be discussed by the research team and will appear in an Honours thesis. We also aim to publish the results of this study in an academic journal. It is anticipated that preliminary results will be available in December 2019. A summary of results will be published on the Division of Psychology research page.

11. What if I have questions about this study?

If you have any further queries, concerns or questions about this study, please do not hesitate to contact by email the student researcher, Kate Stephens by email (khs@utas.edu.au) or research supervisor Dr. Kimberley Norris (kimberley.norris@utas.edu.au).

This study has been approved by the Tasmania Health and Medical/Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, you can contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 6254 or email human.ethics@utas.edu.au / ss.ethics@utas.edu.au. The Executive Officer is the person nominate to receive complaints from research participants. You will need to quote H0018139.

12. How can I agree to be involved?

This is an anonymous survey. Consent for this study is implied through the completion and submission of your responses to the survey.

Thank you for your time

Appendix F: Minimal Risk Ethics Application Approval

UNIVERSITY of TASMANIA

11 June 2019

Dr Kimberley Norris
C/- University of Tasmania

Sent via email

Dear Dr Norris

REF NO: H0018139
TITLE: Academic Resilience, Academic Buoyancy and the Motivation and Engagement Scale: A Construct Validity Approach.

We are pleased to advise that acting on a mandate from the Tasmania Social Sciences HREC, the Chair of the committee considered and approved the above project on 05 June 2019.

Please ensure that all investigators involved with this project have cited the approved versions of the documents listed within this letter and use only these versions in conducting this research project.

This approval constitutes ethical clearance by the Tasmania Social Sciences HREC. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approvals of other bodies or authorities are required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

In accordance with the National Statement on Ethical Conduct in Human Research, it is the responsibility of institutions and researchers to be aware of both general and specific legal requirements, wherever relevant. If researchers are uncertain they should seek legal advice to confirm that their proposed research is in compliant with the relevant laws. University of Tasmania researchers may seek legal advice from Legal Services at the University.

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the *National Statement on the Ethical Conduct in Human Research* (NHMRC 2007 updated 2018).

Therefore, the Chief Investigator's responsibility is to ensure that:

(1) All investigators are aware of the terms of approval, and that the research is conducted in compliance with the HREC approved protocol or project description.

(2) Modifications to the protocol do not proceed until **approval** is obtained in writing from the HREC. This includes, but is not limited to, amendments that:

(i) are proposed or undertaken in order to eliminate immediate risks to participants;
(ii) may increase the risks to participants;
(iii) significantly affect the conduct of the research; or
(iv) involve changes to investigator involvement with the project.

Please note that all requests for changes to approved documents must include a version number and date when submitted for review by the HREC.

(3) Reports are provided to the HREC on the progress of the research and any safety reports or monitoring requirements as indicated in NHMRC guidance. Researchers should notify the HREC immediately of any serious or unexpected adverse effects on participants.

(4) The HREC is informed as soon as possible of any new safety information, from other published or unpublished research, that may have an impact on the continued ethical acceptability of the research or that may indicate the need for modification of the project.

(5) All research participants must be provided with the current Participant Information Sheet and Consent Form, unless otherwise approved by the Committee.

(6) This study has approval for four years contingent upon annual review. A *Progress Report* is to be provided on the anniversary date of your approval. Your first report is due 05 June 2020**,** and you will be sent a courtesy reminder closer to this due date. Ethical approval for this project will lapse if a Progress Report is not submitted in the time frame provided

(7) A *Final Report* and a copy of the published material, either in full or abstract, must be provided at the end of the project.

(8) The HREC is advised of any complaints received or ethical issues that arise during the course of the project.

(9) The HREC is advised promptly of the emergence of circumstances where a court, law enforcement agency or regulator seeks to compel the release of findings or results. Researchers must develop a strategy for addressing this and seek advice from the HREC.

Should you have any queries please do not hesitate to contact me on (03) 6226 6254 or via email ss.ethics@utas.edu.au.

Yours sincerely

Jude Vienna-Hallam
Executive Officer I Social Sciences